THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 20

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KIKUJI KAWAKAMI
and HIROYUKI OSAKI

Appeal No. 95-3849
Application 08/029,549[1]

HEARD: November 6, 1998

Before MARTIN, BARRETT, and TORCZON, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

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[1] Application for patent filed March 11, 1993, entitled "Magnetic Tape Guide Apparatus," which claims the foreign filing priority benefit under 35 U.S.C. § 119 of Japanese Application P04-055668, filed March 13, 1992.

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 1-6.

We reverse.

BACKGROUND

The disclosed invention is directed to a magnetic tape guide having a roughened surface which reduces frictional resistance due to humidity.

Claim 1 is reproduced below.[2]

> 1. A magnetic tape guide apparatus, comprising:
> a guide member having a cylindrical profile for guiding a magnetic tape along a magnetic tape guide face provided by an outer circumferential face thereof, said magnetic tape guide face being formed as a roughened face wherein the height * of crests is selected within the range of 0.2 μm to 3.0 μm and the pitch x of the crests is selected so that it satisfies 0.050 mm # x # $(329*)^{0.25}$ mm.

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[2] We question the derivation of the expression for pitch x in terms of * in the specification at pages 37-38. In Marks' Standard Handbook for Mechanical Engineers (McGraw-Hill, Inc. 9th ed. 1987), page 5-24 (copy attached), the expression for maximum displacement for a uniformly loaded beam fixed at the ends is $f(max) = Wl^3/EI384$ or $*max = wx^3/EI384$ using appellants' notation. The specification uses $*max = wx^4/384EI$ (page 37), which requires *max to be dimensionless. This causes a discrepancy in the use of the term * in claim 1 because the limitation of "the height * of crests is selected within the range of 0.2 μm to 3.0 μm" requires * to be a dimension measured in microns (μm). It is noted that "max" in the derivation of equation (7) at page 38 of the specification should be "*max."

The examiner relies on the following prior art:

Shiba	4,466,582	August 21, 1984
Kuroda	4,669,019	May 26, 1987
Tollefson	4,745,508	May 17, 1988

Tollefson discloses a tape guide pin made of plastic containing a small proportion of lubricant and anti-static agent, instead of the usual stainless steel. The surface of the plastic pins due to molding was quite rough, e.g., 10 µm peak-to-peak (col. 2, lines 44-47), compared to stainless steel pins which might permit only two peaks of 0.627 µm (col. 1, line 34). However, the performance of the plastic pins, especially in tracking and RF loss at high temperatures and humidity, was considered outstanding (col. 2, approx. lines 34-39).

Kuroda discloses making the stationary drum of a video tape recorder with a tape guide surface area comprising a solid solution or a eutectic material which is composed of aluminum as a major component, which contains crystals consisting predominantly of Si (col. 3, lines 8-15). The Si crystals present at the surface are disposed to project from the solid solution or eutectic surface by etching. In

particular, crystals "consisting predominantly of Si having a size not larger than 80 microns are projected by approximately 0.3 to 3 microns from the surface area 20 (see FIG. 4) of the solid solution or eutectic material" (col. 3, lines 46-50).

Shiba discloses a tape guide in the form of a cylindrical roller having depressed rectangular portions 32 and raised rectangular portions 34 alternately formed in a circumferential direction. The diameter elevated portion has a width of from 0.01 mm to 0.1 mm and a spacing between adjacent elevated portions of from 0.05 mm to 0.15 mm. The depth of the depressed portion 32 from the outer surface is in the range of from 5 to 20 μm (col. 3, line 68 through col. 4, line 5). "This tape guide makes it possible to remarkably reduce the contact surface with the magnetic tape, thereby reducing the friction of the running tape with the tape guide, and to secure stable running of the tape . . . ." (Col. 2, lines 29-33.)

Claims 1-4 and 6 stand rejected under 35 U.S.C. § 103 as being unpatentable over Tollefson and Kuroda.

Claim 5 stands rejected under 35 U.S.C. § 103 as being unpatentable over Tollefson, Kuroda, and Shiba.

We refer to the Final Rejection (Paper No. 9) (pages referred to as "FR__") and the Examiner's Answer (Paper No. 15) (pages referred to as "EA__") for a statement of the examiner's position and to the Brief (Paper No. 14) (pages referred to as "Br__") for appellants' position.

OPINION

Initially, the examiner clearly errs in finding that "Tollefson discloses a tape guide apparatus having a guide member (14, 19) including a roughened surface which appears to comprise 'substantial' parallel grooves (see column 4, line 67) of which the pitch length is 0.010 mm (see column 5, line 28), as set forth in claims 1 and 6" (EA3-4). First, Tollefson does not hint at parallel "grooves": the measured roughness numbers are for random peaks due to the molding process, not grooves. The surface in Tollefson is not intentionally made rough. Second, the 10 µm (0.010 mm) dimension is the peak-to-peak distance, which corresponds to "the height * of the crests" in claim 1, not the pitch length x as found by the examiner. Since the peaks in Tollefson are randomly distributed, no pitch distance is implied or disclosed. The 10 µm height is not within the claimed range

of 0.2 µm to 3.0 µm and even if the 10 µm (0.010 mm) roughness was the pitch x, it does not fall within the claimed range of 0.050 mm # x # $(329^*)^{0.25}$ mm. Therefore, Tollefson does not teach crests having a pitch or height as claimed.

The examiner finds that "Kuroda discloses a magnetic head drum apparatus having a guide member 1 in which the height of the crest is 3.0 µm (see column 3, lines 47 to 49)" (EA4). We agree. Claim 1 is broadly drafted and does not require the crests to be formed by the height of material between grooves; thus, the crests may be formed by individual particles such as Kuroda. Claim 1 does not specify grooves or any shape to the roughness, such as the sinusoidal-shaped surface in appellants' figure 1. Nor does claim 1 specify that the crest height or pitch are uniform. Furthermore, none of the claims recited any orientation for the crests compared to the direction of tape movement: claim 6 recites "substantially parallel grooves," but the grooves could be circumferential or longitudinal on the cylindrical guide member. Kuroda, however, does not disclose the distance between the silicon particles corresponding to the pitch.

We disagree with the examiner's position (FR4; EA5) that the dimensional limitations are not a basis for patentability because applicants have not shown the chosen dimensions to be critical. Appellants provide several pages of discussion in the specification along with numerous graphs that show the criticality of the claimed dimensions and relationships at various humidity conditions (specification, pages 34-40). The dimensions and relationships cannot be ignored.

We disagree with the examiner's conclusion that one having ordinary skill in the art would have been motivated to modify the guide member of Tollefson to have a pitch x in the claimed range of 0.050 mm # x # $(329*)^{0.25}$ mm with a crest height * within the claimed range of 0.2 µm to 3.0 µm as taught by Kuroda "in order to reduce the contact friction between the guide member and the magnetic tape" (FR4, EA5). "[D]iscovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980). In this case, however, there is no evidence that pitch was a known result effective variable that could be experimented with to reduce contact friction. Kuroda

discloses a height of particles above the surface of 0.3 to 3 µm, which is within the claimed range of 0.2 µm to 3.0 µm and which provides a low coefficient of friction. But neither Kuroda nor Tollefson disclose the pitch or suggest that pitch is a parameter in reducing friction. Moreover, since the surface roughness in Tollefson is an undesired result of the molding process rather than an intentional feature, there is no motivation for one skilled in the art to modify Tollefson to provide the claimed roughness. Appellants describe that the relationship between crest height * and pitch is critical: if the height * is too small, a sudden rise in frictional resistance occurs almost irrespective of the pitch (specification, page 35), whereas if the pitch is too great a slack occurs with the magnetic tape causing a loss of the effect of the crests (specification, page 37, discussing figure 15). Because we find no teaching or suggestion in the prior art to vary the pitch between protrusions to reduce the frictional resistance or for any other reason, we conclude that the examiner has failed to establish a prima facie case of obviousness. The rejection of claims 1-6 is reversed.

The examiner applies Shiba in the rejection of claim 5 only for its teaching of a metal layer on the tape guide. It appears that the examiner has overlooked relevant teachings in Shiba. Shiba shows circumferential grooves like appellants' preferred embodiment (specification, page 5), although no grooves are claimed except in claim 6, which does not specify the groove direction. Although nothing is said in Shiba about the use of the grooves to reduce friction due to humidity, the grooves in Shiba are for the purpose of reducing friction. The crest height * in Shiba is from 5 to 20 µm. The elevated rectangular portions in Shiba have a pitch of from 0.06 mm to 0.25 mm, which appears to satisfy the claimed pitch range of $0.050 \text{ mm} \# x \# (329*)^{0.25}$ mm for * from 5 to 20 µm. It is noted that the prior art does not have to teach the expression $0.050 \text{ mm} \# x \# (329*)^{0.25}$ mm, it only has to teach a crest pitch within the range. It is also noted that the claims do not preclude the crest from being flat or any other shape. The minimum crest height * of 5 µm is slightly outside the claimed range of 0.2 to 3.0 µm. The maximum crest height is for manufacturing reasons, and is not a function of the friction: "where * > 3.0 µm, a significant influence is had on the

roundness, and there is a possibility that stabilized transport of a magnetic tape may be obstructed" (specification, page 35). Nevertheless, the examiner has not relied on the groove structure of Shiba or provided any reasoning why it would have been obvious to make the crest height smaller in Shiba. Because we review the examiner's rejection, we do not address whether the height limitation of claim 1 would have been suggested by Shiba in light of other prior art, such as Kuroda.

CONCLUSION

The rejections of claims 1-6 are reversed.

REVERSED

JOHN C. MARTIN Administrative Patent Judge	)
LEE E. BARRETT Administrative Patent Judge	) BOARD OF PATENT APPEALS AND INTERFERENCES
RICHARD TORCZON Administrative Patent Judge	)

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